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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,076	10/21/2005	Toshio Tahira	63,128 (70904)	1859

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EXAMINER	
HORNING, JOEL G	

ART UNIT	PAPER NUMBER
1712	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,076	TAHIRA ET AL.	
	Examiner	Art Unit	
	JOEL G. HORNING	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *59-62* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *59-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. In the amendment to claims filed December 21st, 2010: applicant has amended claim 59. Claims 59-62 are currently pending for examination.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 21st, 2010 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. **Claims 59-62** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al (US 2002/0067123) in view of Himeshima et al (US 20010009689) in view of Chang et al (US 2002/0118251) in view of Hawkins et al (US 2002/0130931) in view of Silverbrook (US 6284147) in view of Akahira et al (US 6394578) in view of Nagai (US 5702833).

Seki et al is directed towards a method for forming an EL device for a display [0001]. The process for forming the device shown in figure 1 comprises: preparing a substrate **10**, patterning a first electrode **11** onto the substrate, forming a barrier **12** between pixels on the first electrode out of silica [0030], forming a light emitting layer **18** [0032] by ejecting droplets from an inkjet apparatus [0029] onto the first electrode between the barrier **12**, so that the barrier is lower than the light emitting layer (both seen in figure 1), and then forming a second electrode **19 (or 23)** on the light emitting layer [0033-0034].

Regarding the limitation that the adjacent pixels be different colors, Seki et al teaches that color displays of their type are desirable [0003], but it does not teach how such a display would be arranged. However, **Himeshima et al** is also towards a process for forming an EL device for displays [0001] particularly a color display and it teaches that EL color displays can be formed by utilizing different colored pixels (Red, Green, and Blue) which are arranged adjacent to each other as seen in figure 1, so the different color pixels can be driven to display a colored image [0058].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the device of Seki et al by placing pixels of different colors adjacent to each other, as taught by Himeshima et al in order that those different colored pixels can be driven in order to produce what appears to be a colored image, so a color display results.

However, **Chang et al** is directed towards inkjet deposition processes and it teaches that reducing the volume of the drops ejected by inkjet devices allows for increased resolution of the produced image. To this end, they teach that inkjet devices with drop sizes less than 1pl are commercially available in order to produce high resolution images [0003].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use drop sizes that are as small as possible, such as of 1pl or less with the process of Seki et al in order to increase the resolution of the produced pattern, which would allow for better quality patterning and the production of higher resolution displays to be made using the Shimoda et al method.

Seki et al does not teach what the viscosity of the liquid is or the nozzle diameter. However, **Hawkins et al** is directed towards inkjet deposition processes and it teaches that the fluid viscosity is a result effective variable for determining the size of the produced droplet and that the diameter of the nozzle is a result effective variable for determining the flow of ink through the nozzle and thus the droplet size [0094].

Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed viscosity ranges of a "viscosity of 20cP or greater" and the instantly claimed nozzle with a "diameter from 0.2 microns to 4 microns" through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Seki et al does not specify what kind of inkjet method is used, so it does not specifically teach using an inkjet device where there is electric field generated between an electrode of the nozzle and a counter electrode during the deposition process (e.g. an electrostatic-type inkjet).

However, **Silverbrook et al** is directed towards depositing films by inkjet methods and teaches using an inkjet device where electrostatic attraction caused by an electric field produced between two facing electrodes (the capacitor **13**) in the nozzle causes the ink to eject. As shown in figure 2, the electrodes are part of the nozzle device (col 5, line 65 through col 6, line 25).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use an inkjet device with two such opposing electrodes in order to deposit the organic EL material layers of Seki et al since it was a known inkjet method, which would be suitable for depositing the inks and produce predictable results.

Seki et al teaches that the area of the pixel can be formed in a variety of shapes, for instance, as a stripe [0030], but it does not teach how the droplets are placed in sequence to appropriately fill that area.

However, **Akahira et al** is also directed towards ink-jet deposition of colored material to form the pixels of a display device (abstract). This ink, like that in Seki et al, is supplied into aperture regions surrounded by barriers, which define the pixels. It teaches that unevenness in the ink is problematic in the art (col 4, line 66 through col 5, line 4), and is due to non-uniform thicknesses in the ink (col 5, lines 24-27). It teaches that their deposition method to overcome this problem, the ink supplied to each pixel is provided by a series of ejected droplets provided by different nozzles in different scans of the inkjet head. By doing this, the amount of ink supplied to each pixel is made more uniform, improving the unevenness in the ink (the non-uniformities in the layer's thickness) (figures 2A-C, col 5, lines 24-65). The teaching is made even more clear in figures 8A-9B, where Akahira et al shows this overlap between the droplets improves the uniformity of the layer and teaches that due to the time delay between the different scans, the previously deposited droplets dry (forming a first layer), so that the subsequently deposited droplets (a second layer),

whose landing position is in the middle of the landing positions of two adjacent droplets previously deposited **(claim 61)**, overlap with these previously deposited droplets, the droplet size should be controlled to further reduce unevenness in the layer (col 10, line 59 through col 11, line 34).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use the deposition pattern of Akahira et al in the inkjet process of Seki et al, shifting the landing positions of the overlapping droplets as they are deposited from the inkjet head in different scans, forming two layers, in order to use different nozzles for the same pixel, and so doing improving the uniformity of the deposited layer, which is ***making the layer as flat as possible***. Increasing uniformity of a layer is understood to be generally desirable, and in this case would be further expected to improve the perceived uniformity in the color of the pixels.

Regarding the requirement that the light emitting layer formation region be bounded by the barrier, as seen in figure 7, Seki teaches depositing two layers, a transportation layer **21** and a light emitting layer **22** into the cavity defined by the barrier **12** [0034]. However, only the hole injection layer is shown in contact with and so bounded by the barrier.

Nagai is also directed towards making light emitting EL devices (col 1, lines 5-10). It teaches that in conventional designs for EL devices the luminescent layer can comprise either one layer (a light emitting layer) or two layers (a transportation layer and a light emitting layer) (col 1, lines 22-28). Nagai further practices a single layer design as part of their invention (col 15, lines 40-52).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to replace the two layer luminescent layer of Seki with a single layer design as taught by Nagai as a conventional and suitable alternative design for the light emitting layer which would produce predictable and desirable results. When there is a single layer, the light emitting layer formation region is bounded by the barrier of Seki **(claim 59)**.

4. Regarding **claim 60**, Silverbrook et al further teaches that when as the droplet is ejected, the meniscus expands from the nozzle outlet during ejection, as shown in figure 5, the diameter of the droplet is larger than the diameter of the nozzle outlet, so that immediately after ejection, from which it is readily apparent that the diameter of the droplet will be larger than the diameter of the nozzle outlet.

   It is readily apparent that in the process of using an electrostatic ejection inkjet nozzle, that electrical charges are induced. Without any particular claimed method of defining the boundary of "a region where the charge is concentrated" or "a region of the meniscus," the examiner defines a region where the charge is concentrated that is equal in area to a region of the meniscus, meeting the claim limitation **(claim 60).**

5. Regarding **claim 62,** Seki et al teaches forming a barrier layer structure, which is located in the same location as applicants wiring, but it does not teach that it functions as a black matrix. However, **Himeshima et al** is also directed towards a process for forming an EL device for displays [0001], as shown in figure 14, it teaches applying a comparable barrier structure (first spacers) **3** on the first

electrode **2** of their device to perform the same function as Seki (divide the pixels) [0076], which can, also like Seki, be made out of silica. Himeshima et al further teaches that these barrier structures can also be blackened in order to have them function as a black matrix material, increasing the contrast between pixels [0077].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the structure of Seki et al in view of Himeshima et al to blacken the barrier structure in order to increase the contrast between the pixels **(claim 62)**.

Response to Arguments

6. Applicant's arguments with respect to claims 59-62 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by amendment.
7. Applicant first argues that the previous rejection did not meet the limitation requiring that the layer formation region be “between the barrier.” The examiner respectfully notes that this limitation is not present in the claim set, having been replaced by the requirement "a light emitting layer formation regions bounded by said barrier," so the argument is not relevant to the current claim set. The new limitations have been considered in the rejection above.
8. Regarding applicant’s argument that Seki does not contemplate making the light emitting layer “as flat as possible,” as is found in the rejection above, Akahira teaches the desirability of a flat/uniform surface, so Seki does not need to teach this.

9. Regarding applicants argument that the claims require that the light emitting layer “exceeds the height of the upper portion of the bank," the current claim language does not require this, but rather is open to coating the specified barrier layer with an additional layer or layers. Until the claim language excludes this possibility, this interpretation is valid and will be maintained.

10. Regarding applicant’s argument that the light emitting layer of Seki overflows the barrier, the claim does not exclude this. In the currently applied rejection, the light emitting layer is bounded on its sidesby the barrier for the full height of the barrier and bounded below by the barrier where it overlaps. The claims do not exclude this.

Conclusion

11. No current claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1712

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1712